



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/718,574	11/24/2003	Hitoshi Morinaga	245683US0CONT	1231
22850	7590	11/03/2004		
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314				
			EXAMINER CHAUDHRY, SAEED T	
			ART UNIT 1746	PAPER NUMBER

DATE MAILED: 11/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/718,574

Applicant(s)

MORINAGA ET AL.

Examiner

Saeed T Chaudhry

Art Unit

1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 11-24-03, 2-6-04
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_

## DETAILED ACTION

### Claim Rejections - 35 USC § 112

Claims 8 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite in that it fails to point out what is included or excluded by the claim language. This claim is an omnibus type claim.

### Claim Rejections - 35 USC § 103

**The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:**

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

**Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takaishi et al.**

Takaishi et al (6,146,467) Disclose a method of cleaning a semiconductor substrate by immersing the substrate in an aqueous solution of ammonium hydroxide and hydrogen peroxide and then rinsing the substrate by immersing the substrate in a solution of hydrofluoric acid and a compound selected from the group consisting of an organic acid containing a carboxylic group (see claims). The concentration of the hydrofluoric acid used is from 0.005 to 0.25 wt.%. (see col. 4, lines 3-4). Takaishi et al reference did not mention the time of treatment with hydrofluoric

acid. The reference fails to disclose to clean the surface with hydrofluoric acid solution and then with alkaline solution, wherein the cleaning time is at most 45 seconds with concentration and temperature satisfy the relationship of  $0.25 \leq tC^{1.29} \leq 5$ .

It would have been obvious at the time applicant invented the claimed process to reverse the order of cleaning steps of the surface as disclosed by Takaishi et al i.e. cleaning with hydrofluoric acid and then with alkaline solution. Since it has been held obvious for selection of any order of performing process steps in the absence of new or unexpected results (see *In re Gibson*, 5 USPQ 230 (CCPA 1930). Therefore, one of ordinary skill in the art would expect the same results by reversing the Takaishi et al process by using hydrofluoric acid step first and then using an alkaline cleaning. Since the reference disclose to clean the surface within the claimed range of the hydrofluoric acid. Therefore, one of ordinary skill in the art would manipulate the time of treatment with routine experimentation so that the cleaning solution would not damage the surface and remove all the contaminants from the surface.

**Claims 1-7 and 10-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takaishi et al in view of Schulz.**

Takaishi et al (6,146,467) Disclose a method of cleaning a semiconductor substrate by immersing the substrate in an aqueous solution of ammonium hydroxide and hydrogen peroxide and then rinsing the substrate by immersing the substrate in a solution of hydrofluoric acid and a compound selected from the group consisting of an organic acid containing a carboxylic group (see claims). The concentration of the hydrofluoric acid used is from 0.0005 to 0.25 wt.%. (see col. 4, lines 3-4). Takaishi et al did not mention the time of treatment with hydrofluoric acid. The reference fails to disclose a complexing agent included in the alkaline

cleaning solution and pH of the cleaning agent, wherein the cleaning time is at most 45 seconds with concentration and temperature satisfy the relationship of  $0.25 \leq tC^{1.29} \leq 5$ .

Schulz (5,637,151) discloses a method for reducing the metal contamination on the surface of a silicon wafer during an "RCA-clean" cleaning sequence performed on said silicon wafer in fabricating semiconductor devices therefrom, the improvement comprising: adding a complex building agent comprising of EDTA to a chemical solution containing  $\text{NH}_4\text{OH}$ ,  $\text{H}_2\text{O}_2$ , and  $\text{H}_2$  provided for use in an "SC 1" cleaning step of said "RCA-clean", for providing a modified "SC 1" cleaning solution for keeping metal complexes bound in solution to substantially prevent the metal complexes from being retained on the surface of said silicon wafer, wherein the modified "SC 1" cleaning solution comprises a concentration of EDTA ranging from about 0.05 mg/l to about 0.10 mg/l (see claims). The reference fails to disclose a step of cleaning with a hydrofluoric acid and a relationship of  $0.25 \leq tC^{1.29} \leq 5$ .

It would have been obvious at the time applicant invented the claimed process to incorporate a complexing agent as disclosed by Schulz into the process of Takaishi et al for the purpose of reducing the metal contamination left on the surface of a substrate. Further none of the references specify the pH of the cleaning solution but one of ordinary skill in the art would expect that the pH would be more than 9 because the percentage of the ammonium hydroxide is greater and one would manipulate the pH value with routine experiment to increase the effectiveness of the cleaning solution. Schulz discloses the concentration of the complexing agent within the range of the claimed process. Furthermore, Takaishi et al utilize the hydrofluoric acid within the claimed percentage and one would manipulate the time of treatment with routine experimentation which would not damage the surface and provide effective cleanliness.

**The Prior art**

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Hayashida et al (5,840,127) disclose a method of cleaning substrate surface treating agent having an alkali, hydrogen peroxide and water and a step of rinsing the surface with water, wherein at least one of the surface treating agent and the rinsing water contains a complexing agent and alkali is quaternary ammonium hydroxide.

Matsuo et al (6,296,714) disclose a method of cleaning a semiconductor with a solution containing 0.0001 to 0.1% of an organic acid and 0.005 to 0.25% of hydrofluoric acid and second step of cleaning with oxidizing solution.

*Any inquiry concerning this communication or earlier communications from the examiner should be directed to Saeed T. Chaudhry whose telephone number is (571) 272-1298. The examiner can normally be reached on Monday-Friday from 9:30 A.M. to 4:00 P.M.*

*If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Michael Barr, can be reached on (571)-272-1414. The fax phone number for non-final is (703)-872-9306.*

*When filing a FAX in Gp 1700, please indicate in the Header (upper right) "Official" for papers that are to be entered into the file, and "Unofficial" for draft documents and other communication with the PTO that are for entry into the file of the application. This will expedite processing of your papers.*

*Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (571) 272-1700.*

*Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).*

**Saeed T. Chaudhry**  
Patent Examiner

**MICHAEL BARR**  
SUPERVISORY PATENT EXAMINER

